Michigan Department of Labor and Economic Growth
Office of Adult Education and Commission on Spanish Speaking Affairs
General Educational Development Curriculum Framework
Mathematics

Mathematics Content Standard
The adult learner is able to use and apply mathematical concepts and principles in a variety of academic and real-life situations.

Level (EFL): **Adult Secondary Education (GED)**

Strand A: **Number Operations and Number Sense**

Objective **1.0 Develops and applies number sense to solve a variety of real-life problems and to determine if the results are reasonable.**	
Benchmarks **The adult learner is able to:**	**Examples of How/Where Adults Use This Skill**
1.1 Represent and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific) in real-life and mathematical problem situations.	The adult learner understands the different types of equivalencies and is able to use them in various situations. • Convert decimals and fractions in workplace settings, such as measuring an item and converting from fractions to decimals. • Recognize figures that are equivalent, e.g., 50% = ½ = .5 of an amount. • Convert and display real numbers in the different forms.
1.2 Represent, analyze, and apply whole numbers, decimals, fractions, percents, ratios, proportions, exponents, roots, and scientific notation in a wide variety of situations.	The adult learner has a sufficient understanding of real numbers and can apply that knowledge to academic and real-life situations. • Read and compare prices, such as the price of gas from one station to another. • Comprehend information obtained from basic inventory or balance sheets. • Understand and compare changes in the value of stocks. • Read and compare temperature changes. • Use basic math to complete construction projects. • Mix different types of concentrates, such as those used by cleaning companies.
1.3 Recognize equivalencies and order relations for whole numbers, fractions, decimals, integers, and rational numbers.	The adult learner understands order from smallest to largest and largest to smallest when dealing with real numbers. • Understand that a discount of .5, ½, and 50% are all equivalent. • Order numbers, fractions, decimals, integers, and rational numbers from smallest to largest or largest to smallest.
1.4 Select the appropriate operations to solve	The adult student has sufficient understanding of

problems. • Understand and use basic and advanced mathematical terms • Comprehend what a problem is asking, e.g. When should I subtract?	mathematical terms and operations and can use this information to "set-up" a mathematical problem. • Identify the correct operation to use to solve a word problem that uses real numbers. • Understand the operations to use when figuring salary or overtime rates, increasing or decreasing recipes, calculating sale prices or discounts, figuring temperature changes from one time period to another. • Understand and use math vocabulary when discussing mathematical operations.
1.5 Relate basic arithmetic operations to one another.	The adult learner is able to use more than one math operation and algorithm to solve a problem and is able to see how the operations are interrelated, such as multiplication is the same as adding something multiple times and division is a form of subtraction. • Calculate averages for football, hockey, baseball, and basketball teams and individual players. • Complete problems that use all four operations (addition, subtraction, multiplication, division) within one situation. • Explain how math operations are related and can show visually the similarities and differences.
1.6 Calculate with mental math, pencil and paper, and a scientific calculator using whole numbers, fractions, decimals, and integers.	The adult learner is able to effectively use mental math and a scientific calculator in order to check the "reasonableness" of an answer that has been calculated using pencil and paper. • Use mental math as a primary strategy prior to solving problems. • Understand how to use the different basic functions on a scientific calculator. • Calculate real-life problems such as the cost of an item on sale, the cost of painting a room, the amount of product needed for a recipe that is increased, the cost of a vacation or new car. • Check the accuracy of calculated answers using a scientific calculator. • Use mental math tricks, such as rounding, the add-up method, creating a simpler equation, looking for compatibles.
1.7 Use estimation to solve problems and assess the reasonableness of an answer.	The adult learner recognizes the different situations where estimation is necessary in order to calculate a problem or assess the reasonableness of an answer. • Use different estimation strategies such as: front-end, front-end process for division, clustering, finding compatible numbers. • "Guesstimate" the cost of an item that is on sale, the cost of grocery items, the time to travel a given distance, the amount of paint needed to paint a room, the size of an item, etc.
1.8 Use a variety of strategies to solve academic and real-life problems.	The adult learner explores different ways to solve problems using a variety of techniques and algorithms.

	• Distinguish relevant and irrelevant information when assessing a problem. • Can complete basic calculations for real-life problems, such as how much lumber to purchase in order to build a deck or a fence, how much carpet is needed to cover a floor, how much food to purchase for a specific recipe or meal. • Recognize that paper and pencil are not always available and thus, can comfortably use mental math and estimation in order to obtain an answer.

1.9 Use a scientific calculator to compute answers to a variety of academic and real-life problems.	The adult learner recognizes the purpose of a scientific calculator as a useful tool in daily life.
	• Accurately perform basic math functions on the Casio fx-260 Scientific calculator as used on the GED Mathematics Test.
	  • Addition, subtraction, multiplication, division of whole numbers, fractions, decimals, and percents.
	  • Square roots and positive/negative integers
	  • Parenthesis and brackets
	• Identify ways in which the calculator in used to solve real-life problems.
	• Understand the information provided on the GED video regarding use of the Casio fx-260 solar calculator.

Michigan Department of Labor and Economic Growth
Office of Adult Education and Commission on Spanish Speaking Affairs
General Educational Development Curriculum Framework
Mathematics

Mathematics Content Standard
The adult learner is able to use and apply mathematical concepts and principles to a variety of academic and real-life situations.

Level (EFL): **Adult Secondary Education (GED)**

Strand B: **Measurement and Geometry**

Objective	
2.0 Develops and applies measurement and geometry to solve a variety of real-life problems and to determine if the results are reasonable.	
Benchmarks **The adult learner is able to:**	**Examples of How/Where Adults Use This Skill**
2.1 Model and solve problems using the concepts of perpendicularity, parallelism, congruence, and similarity of geometric figures.	The adult learner automatically recognizes basic geometric figures. • Compare and contrast different types of geometric figures, as well as different sizes (proportions). • Compare and contrast size of different real estate properties, room sizes, etc. • Understand parallel and perpendicular for basic construction skills, e.g., putting together furniture, boxes, shelving.
2.2 Use spatial visualization skills to describe and analyze geometric figures and translation/rotations of geometric figures.	The adult learner has the visual and verbal skills to identify and describe the basic concepts of geometric figures. • Describe the rotation of the solar system, i.e., one sphere rotating around another. • Ability to accurately draw geometric figures from visual memory. • Use room blueprint in order to identify the size of furniture needed to meet the spatial limits of a room.
2.3 Use the Pythagorean Theorem to model and solve problems.	The adult learner understands how the Pythagorean Theorem is used in the workplace, such as in building trades and architectural design, as well as in daily life to determine such things as the height of a given object. • Figure the height of an object using the Pythagorean Theorem, such as the height of a light pole. • Figure the shortest distance from Point A to Point B when traveling. • Calculate the size of a television screen.
2.4 Find, use, and interpret the slope of a line, the y-intercept of a line, and the intersection of two	The adult learner interprets the various ways in which lines are used in real-world experiences.

lines, using the slope intercept equation.	• Graph/charts used to survey roads, buildings, other construction projects. • Understand line graphs that use linear intersection to determine optimal pricing.
2.5 Use coordinates to design and describe geometric figures.	The adult learner is able to visualize a geometric figure using coordinates on a coordinate plane grid. • Identify each of the four quadrants on a coordinate plane grid. • Recognize that coordinates are established using two digits, i.e., (5, -5). • Recognize that a seating chart uses the same principles as a coordinate plane grid. • Draw a geometric figure using only provided coordinates. • Locate a specific point on a map using coordinates.
2.6 Identify and select appropriate units of metric and customary measures.	The adult learner uses a variety of measuring systems based on accepted standards. • Read labels using the metric system, particularly medicines. • Measure products using both metric and the standard measurement system, e.g., inches to centimeters, miles to kilometers, cups to liters, etc.
2.7 Convert and estimate units of metric and customary measure (all conversions within systems).	The adult learner is able to visualize the different measurement systems and can easily convert between the metric and standard measurement system utilized in the United States. • Able to convert back and forth from Celsius to Fahrenheit when figuring temperature. • Convert recipes and food products to/from metric. • Compute distance when traveling in countries using metric.
2.8 Solve and estimate solutions to problems involving length, perimeter, area, surface area, volume, angle measurement, capacity weight, and mass.	The adult learner understands basic geometric formulas and is able to apply them to real-life situations. • Figure household dimensions for flooring, painting, fencing, construction, etc. • Calculate the amount of material needed to fill a given void, e.g., how much dirt it takes to fill a specific hole in one's backyard. • Figure the limit load bearing weight an object will hold.
2.9 Use uniform rates (e.g., miles per hour, bushels per acre) in problem situations.	The adult learner uses provided rate information when drawing conclusions. • Calculate how much gas it will take to complete a trip based on an average of *x* miles per gallon. • Figure the average cost of producing a product. • Calculate air travel and time for a trip.

2.10 Read and interpret scales, meters, and gauges.	The adult learner uses various measurement tools. • Read and interpret dash board gauges on an automobile. • Read and interpret floor plans and maps using legends and scales. • Read an electric meter in order to determine usage.
2.11 Predict the impact of changes in linear dimension on the perimeter, area, and volume of figures.	The adult learner can increase or decrease measurement factors and understands the impact of doing so. • Calculate the impact of enlarging a room in a building through the drawing of a floor plan that is proportionately similar to the original. • Determine how the shape of an object changes the volume of liquid it will hold, e.g., using a pie-shaped versus a rectangular pan for a recipe.

Michigan Department of Labor and Economic Growth
Office of Adult Education and Commission on Spanish Speaking Affairs
General Educational Development Curriculum Framework
Mathematics

Mathematics Content Standard
The adult learner is able to use and apply mathematical concepts and principles to a variety of academic and real-life situations.

Level (EFL): **Adult Secondary Education (GED)**

Strand C: **Data Analysis, Statistics, and Probability**

Objective **3.0 Develops and applies data analysis, statistics, and probability to solve a variety of real-life problems and to determine if the results are reasonable.**	
Benchmarks **The adult learner is able to:**	**Examples of How/Where Adults Use This Skill**
3.1 Construct, interpret, and draw inferences from tables, charts, and graphs.	The adult learner has developed graphic literacy skills in order to visualize information that is presented. • Use a coordinate plane grid in order to identify and plot coordinates in each of the four quadrants. • Interpret data and draw conclusions from income or sales tax charts, sports statistics, stock market indices, newspaper and magazine tables, charts, and graphs.
3.2 Make inferences and convincing arguments that are based on data analysis.	The adult learner is able to use data in real-life in order to compete in the workplace. • Conduct surveys and summarize results. • Read business financial reports. • Compare and contrast the price of items and evaluate which is the best deal.
3.3 Evaluate positions or viewpoints that are based on data analysis, including distinguishing between correlation and causation.	The adult learner understands the reason for different opinions based on data. • Reading newspapers report • Evaluating statistics provided through the media • Determining the effectiveness based on statistics provided • Comparing different "facts" based on statistics
3.4 Represent data graphically in ways that make sense and are appropriate to the context.	The adult learner can represent data through creating graphs, tables, and charts. • Construct appropriate bar graphs, line graphs, and pie charts when provided with data. • Create spreadsheets. • Develop graphs, charts, and tables to use at meetings, such as showing the growth or loss of a company's profits or an increase in book sales for a PTO event.
3.5 Apply measures of central tendency (mean, median, mode) and analyze the effect of changes	The adult learner has sufficient understanding of statistics in order to use this data in daily life.

in data on these measures.	• Calculate averages for football, hockey, baseball, basketball games. • Determine one's grade or ranking in a class. • Analyze election results through looking at voting patterns in different areas.
3.6 Use an informal line of best fit to predict from data.	The adult learner makes generalizations based on data and personal experiences. • Determine whether or not one can afford an item, such as a house, car, vacation, etc., based on personal knowledge, cost, and income. • Use tables and graphs to determine which sports team will have the greatest success for the season.
3.7 Apply and recognize sampling and bias in statistical claims.	The adult learner makes decisions based on fact rather than marketing strategies and ploys. • Identify truth versus perception in advertising. • Purchase products based on hard data rather than advertising claims or current trends/fads. • Understand that sampling is based on a small group or a biased group leading to information that can be flawed.
3.8 Make predictions that are based on experimental or theoretical probabilities, including listing possible outcomes.	The adult learner reviews possible options, probabilities, and outcomes before making final decision. • Project retirement income and benefits based on a variety of scenarios, i.e., reliability of Social Security system, projection of investment income, pension options, raises, promotions, etc. • Make employment predictions and determine how they relate to the economy and the individual. • Assess changes in the value of property based on projected rate of return.
3.9 Compare and contrast different sets of data on the basis of measures of central tendency and dispersion.	The adult learner uses available data to make predictions based on mean, median, mode, and distribution. • Use census data in reports to identify product, housing, food needs, etc. • Review population distributions to compare and contrast changes based on area. • Average GED scores from different time periods to compare and/or contrast fluctuations. • Compare and contrast gas prices based on supply and demand.

Michigan Department of Labor and Economic Growth
Office of Adult Education and Commission on Spanish Speaking Affairs
General Educational Development Curriculum Framework
Mathematics

Mathematics Content Standard
The adult learner is able to use and apply mathematical concepts and principles to a variety of academic and real-life situations.

Level (EFL): **Adult Secondary Education (GED)**

Strand D: **Algebra, Functions, and Patterns**

Objective **4.0 Develops and applies algebra, function, and patterns to solve a variety of real-life problems and to determine if the results are reasonable.**	
Benchmarks **The adult learner is able to:**	**Examples of How/Where Adults Use This Skill**
4.1 Analyze and represent situations involving variable quantities with tables, graphs, verbal descriptions, and equations.	The adult learner takes situations and represents the data in a variety of ways. • Calculate permutations and combinations, e.g., how many clothing combinations can be made with four blouses and three skirts. • Determine how many miles can be driven on a tank of gas by different types of vehicles.
4.2 Recognize that a variety of problem situations may be modeled by the same function or type of function (e.g., $y = mx + b$, $y = ax^2$, $y = ax$, $y = 1/x$).	The adult learner recognizes that formulas may need to be converted depending on which factor is unknown. • Use tools such as a stop-watch, a distance measuring device, and a car driving to calculate the speed (rate) of the car or the distance traveled dependent on the missing variable. • Identify different real-life scenarios that can be solved by the same algebraic formula.
4.3 Convert between different representations, such as tables, graphs, verbal descriptions, and equation.	The adult learner knows how to best represent data based on the situation and how to read data from a variety of descriptors. • Convert a table of sports' statistics to a graphic format. • Create a graph to show the areas in which one's monthly income is spent.
4.4 Create and use algebraic expressions and equations to model situations and solve problems.	The adult learner recognizes that problems have unknown factors and is able to set up and solve problems using algebraic expressions. • Complete magic squares. • Determine patterns in number sequences, i.e. What number comes next in this pattern? 3, 12, 48, . . .
4.5 Evaluate formulas.	The adult learner not only uses formulas, but is able to

	evaluate a formula for applicability to a situation. • Use formulas to calculate increases in wages that include multiple factors, e.g., how long a person has been working on the job, the evaluation the person received, current salary scale for the position, etc. • Determine an appropriate formula to use to solve for an unknown, i.e., figuring gas mileage, determining how long it takes to get to a destination, determining the best buy from store to store, etc.
4.6 Solve equations, involving first degree, quadratic, power, and system of linear equations.	The adult learner has sufficient understanding of algebraic formulas to use them in real-life situations. • Use quadratic equation formula to figure matting and frame size for a picture. • Calculate fencing needs for a yard.
4.7 Recognize and use direct and indirect variation.	The adult learner recognizes that there are many influences on mathematical information. Some of these influences vary from situation to situation, thus, the adult learner needs to recognize the impact of indirect variables. • Recognize changes in weather forecasts based on the addition of an unforeseeable event. A change in wind currents can change temperature, tide, rainfall, etc. • Figure interest rates on a banking account and the impact of natural disaster on the rate of return. • Calculate the potential cost of health insurance for one's lifetime, realizing the impact of poor health habits.
4.8 Analyze tables and graphs to identify and generalize patterns and relationships.	The adult learner recognizes that algebraic thinking assists in determining patterns and relationships in real-life situations. • Compare and contrast information from different graphs to determine the best purchase price of an object. • Use graphs to determine the weather patterns for a specific time period. • Use tables regarding past events to generalize the number of attendees at a future event.
4.9 Analyze and use functional relationships to explain how a change in one quantity results in change in the other quantity, including linear, quadratic, and exponential functions.	The adult learner understands algebraic relationships and changes. • Determine the profit and/or loss of a business for the past fiscal year and identify how a change in personnel will impact the upcoming year's profit/loss. • Calculate how putting more money into a tax sheltered annuity will change the amount of tax paid and/or interest earned.